

Appendix B Glossary

B-1. Abbreviations and Acronyms

AE Architect-engineer
AEC Atomic energy commission
ALARA As low as reasonably achievable
AMCCOM Armament, Munitions, and
Chemical Command
ARAR Applicable or relevant and
appropriate requirement

BWR Boiling water reactor

CDQM Chemical data quality management
CDAP Chemical data acquisition plan
CE Corps of Engineers
CENWD Corps of Engineers Northwestern
Division
CERCLA Comprehensive Environmental
Response, Compensation, and
Liability Act of 1980 (Superfund)

CFR Code of Federal Regulations
CFC Chlorofluorocarbon
CHP Certified health physicist
CIH Certified industrial hygienist
CMI Corrective measures implementation
CMS Corrective measures study

DAC Derived air concentration
DERP Defense Environmental
Restoration Program
DoD Department of Defense
DOE Department of Energy
DOE-RL Department of Energy-Richland
Operations Office
DOT Department of Transportation

EC Engineer Circular
EM Engineer Manual
EPA U.S. Environmental Protection Agency
ER Engineer Regulation
ERDA Energy Research and Development
Administration
ETL Engineer Technical Letter

FAR Federal acquisition regulations
FOA Field Operating Activity
FS Feasibility study

FUDS Formerly used defense site

GDQM Geotechnical data quality management

HEPA High-efficiency particulate air
HLRW High-level radioactive waste
HQUSACE Headquarters, U.S. Army Corps
of Engineers
HAP Health and safety plan (see SSHP)
HSWA Hazardous substances and waste
amendments
HTW Hazardous/toxic waste
HTRW Hazardous/toxic/radioactive waste
HOOP Hazardous waste operations permit

IA Interagency agreement

LANL Los Alamos National Laboratory
LINAC Linear accelerator
LLRW Low-level radioactive waste

MCX Mandatory Center of Expertise
MOA Memorandum of Agreement
MOB Memorandum of Understanding
MSC Major Subordinate Command
MAR Minimum technology requirements
MW Mixed waste

NCP National Contingency Plan
NEPA National Environmental Policy Act
NOSH National Institute for Occupational
Safety and Health
NPL National Priorities List
NRC Nuclear Regulatory Commission
NTS Nevada test site

OCONUS Outside Continental United States
ORNL Oak Ridge National Laboratory
OSHA Occupational Safety and Health
Administration
OSWER Office of Solid Waste and Emergency
Response
OVA Office of Technology Assessment

PA Preliminary assessment
PPE Personal protective equipment
PVT Polyvinylchloride
PWR Pressurized water reactor

QA Quality assurance
QAPP Quality assurance program plan
QC Quality control

RA	Remedial action
RCRA	Resource Conservation and Recovery Act of 1976
RD	Remedial design
RFA	RCRA facility assessment
RFI	RCRA facility investigation
RI	Remedial investigation
ROD	Record of decision
RWP	Radiation work permit
SARA	Superfund Amendments and Reauthorization Act of 1986
SARS	Safety analysis and review system
SI	Site inspection
SOP	Standard operating procedure
SSHP	Site safety and health plan
SRP	Savannah River Plant
TRU	Transuranic
TCL	Toxicity characteristic leaching procedure
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

B-2. Terms

ACCURACY: For purposes of environmental investigations, a measure of the systematic error that contributes to the difference between the arithmetic average of a set of measurements and an accepted reference or true value.

ACTIVE MAINTENANCE: Any significant remedial activity needed during the period of institutional control to maintain a reasonable assurance that the performance objectives in pertinent regulations are met. Such active maintenance includes ongoing activities such as the pumping and treatment of water from a disposal unit or one-time measures such as replacement of a disposal unit cover. Active maintenance does not include custodial activities such as repair of fencing, repair or replacement of monitoring equipment, revegetation, minor additions to soil cover, minor repair of disposal unit covers, and general disposal site upkeep such as mowing grass.

ACTIVITY: A measure of the rate at which a material is emitting nuclear radiations; usually given in terms of the number of nuclear disintegrations occurring in a given quantity of material over a unit of time; the standard unit of activity is the Curie (Ci), which is equal to 3.7×10^{10} disintegrations per second (alps). The SI unit is the Becquerel (Bq), equal to 1 alps.

AGREEMENT STATES: Any states with which the Nuclear Regulatory Commission, the Department of Energy, or the Atomic Energy Commission has entered into an effective agreement under subsection 274b of the Atomic Energy Act of 1954. Agreement states have established a well-defined distribution of responsibilities between their agencies and those of the federal government. A nonagreement state is any other state, which will abide entirely by federal law and regulation. (10 CFR 150.3)

ALARA "As Low As Reasonably Achievable": A policy for maintaining exposures (individual and collective) as low as is reasonable, taking into account social, technical, economic, practical and public policy considerations. ALARA is not a dose limit but a standard of excellence that has the objective of attaining doses as far below the applicable controlling limits as is reasonably achievable.

ALPHA RADIATION: One of the particles emitted in radioactive decay; identical in mass with the nucleus of the helium atom, consisting of two protons bound with two neutrons; loses energy rapidly when traversing through matter, e.g., natural alpha radiation can traverse only a few centimeters of air before being halted.

ANION: Ion with negative net electrical charge.

AQUICLUDE: A geological formation which, although porous and capable of absorbing water, does not transmit it at rates sufficient to furnish an appreciable supply for a well or spring.

AQUIFER: A geological stratum or set of beds with relatively high transmissivity and carrying groundwater in quantities to make exploitation for consumption economically feasible; a *confined aquifer* is bounded above and below by aquicludes and is characterized by its ability to force its water higher in elevation than its top boundary; an *unconfined aquifer* is not bounded by an overlying aquiclude and its upper surface is called the *water table*.

BACKGROUND RADIATION: Radiation in the environment from naturally occurring radioactive isotopes, cosmic radiation, and fallout from man's activities such as nuclear weapons testing.

BETA RADIATION: One of the particles emitted during radioactive decay; negatively charged beta particles are identical in mass and electrical charge to the electron. The positively charged type is called a *positron*.

BIOASSAY: Measurement of radioactive material deposited within or excreted from the body. This process includes whole body and organ counting as well as urine, fecal, and other specimen analysis.

BUFFER ZONE: A portion of the disposal site that is controlled by the licensee and that lies under the disposal units and between the disposal units and the boundary of the site.

CATION: Ion with positive net electrical charge.

COMBINED or CO-MINGLED WASTE: Waste that contains a radioactive component and a hazardous component, and does not meet the strict definition of a mixed waste.

CONFINEMENT AREA: An area having structures or systems from which releases of hazardous materials are controlled. The primary confinement systems are process, handling, storage, or disposal enclosures which are surrounded by one or more secondary confinement areas.

CONFINEMENT SYSTEM: The barrier and its associated systems (including ventilation or drainage) between areas containing hazardous materials and the environment or other areas in the facility that are normally expected to have levels of hazardous materials lower than allowable concentration limits.

CURIE (Ci): A unit of radioactivity defined as the amount of a radioactive material that has an activity of 3.7×10^{10} disintegrations per second (alps); milliCurie (mCi) = 10^{-3} Curie; microCurie (μ Ci) = 10^{-6} Curie; nanoCurie (nCi) = 10^{-9} Curie; picoCurie (pCi) = 10^{-12} Curie; femtoCurie (fCi) = 10^{-15} Curie.

DATA QUALITY MANAGEMENT: The combination of activities establishing a quality assurance program and quality control operations that address the acquisition and treatment of data by commercial contractors or governmental personnel and organizations; includes the maintenance of field and laboratory practices and validations of those practices and the resultant interpretations so as to ensure the achievement of explicitly stated data quality objectives; treated by technical area as *Chemical Data Quality Management*, *Radiological Data Quality Management*, and *Geotechnical Data Quality Management*; performed functionally by establishing *Data Quality Objectives*, *Data Management Specifications*, *Data Acquisition Plans*, and *Quality Assurance Reports* for each of the technical areas.

DECONTAMINATION: The selective removal of radioactive and/or hazardous material from a surface or from within another material.

DERIVED AIR CONCENTRATION (DAC): The concentration of a radionuclide in air that, if breathed over the period of a work year, would result in the ALI for that radionuclide being reached.

DISPOSAL SITE: That portion of a land disposal facility which is used for disposal of waste. It consists of disposal units and a buffer zone.

DISPOSAL UNIT: A discrete portion of the disposal site into which waste is placed for disposal. For current near-surface disposal, the unit is usually a trench.

DOSE: The amount of energy deposited in body tissue due to radiation exposure. Various technical terms, such as 'dose equivalent,' 'effective dose,' 'equivalent,' and 'collective dose,' are used to evaluate the amount of radiation an exposed worker receives.

Dose equivalent, measured in units of rem, is used to take into account the difference in tissue damage from different types of ionizing radiation.

Technical definitions for dose terms include the following:

Absorbed dose (D): Energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest in that material. The units of absorbed dose are the rad and the Gray (Gy). 1 Gray equals 100 rad.

Dose equivalent (H_T): The product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and Sievert (Sv). 1 Sievert equals 100 rem.

Effective dose equivalent (H_E): The sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighting factors (W_T) applicable to each of the body organs or tissues that are irradiated ($H_E = \sum W_T H_T$).

Committed dose equivalent ($H_{T,50}$): The dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by a person during the 50-year period following the intake.

Committed effective dose equivalent ($H_{E,50}$): The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues ($H_{E,50} = \sum w_T H_{T,50}$).

Total effective dose equivalent (TEDE): The sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

Shallow dose equivalent: Applies to the external exposure of the skin or an extremity. It is taken as the dose equivalent at a tissue depth of 0.007 cm averaged over an area of 1 cm².

Weighting factor: Factor that represents the proportion of the total stochastic (cancer plus genetic) risk resulting from irradiation to tissue to the total risk when the whole body is irradiated uniformly.

ENGINEERED BARRIER: A man-made structure or device that is intended to improve a land disposal facility's ability to meet the performance objectives in pertinent regulations.

ENGINEERED DISPOSAL: The disposal of hazardous and toxic waste, often in suitable sealed containers in any of a variety of structures especially designed to protect them from water and weather and to prevent leakage to the biosphere by accident or sabotage.

ENVIRONMENTAL SURVEILLANCE: Monitoring of the impact on the surrounding region of the discharges from industrial operations, forest fires, storm runoff, or other natural or man-induced events.

EXPOSURE: A measure of the ionization produced in air by X or gamma radiation. It is the quotient of (1) the sum of the electrical charges on all ions of one sign produced in air when all electrons liberated by photons in a volume element of air are completely stopped in air, divided by (2) the mass of the air in the volume element. The special unit of exposure is the Roentgen equal to 2.58×10^{-4} Coulombs per kilogram. Acute exposure generally refers to a high level of exposure of short duration; chronic exposure is lower-level exposure of long duration.

GAMMA RADIATION: Electromagnetic waves emitted during radioactive decay; also called "nuclear x-rays"; highly penetrating, e.g., a substantial fraction penetrates several centimeters of lead.

GROUNDWATER: Water that exists or flows below the ground surface and that will flow into a well or from a surficial spring due to a pressure equal to or greater than atmospheric pressure.

GROUT: Fluid or semifluid material, often containing portland cement, which may be pumped or poured into earth strata and, by setting up into a solid state, provides mechanical stabilization or water flow control.

HALF-LIFE: The time in which enough of the atoms of a particular radioactive substance disintegrate to another nuclear form to reduce the radioactivity level by half. Measured half-lives vary from millionths of a second to billions of years. After a period of time equal to 10 half-lives, the radioactivity of a radionuclide has decreased to 0.1 percent of its original level.

HAZARDOUS WASTE: Those wastes designated as hazardous by Environmental Protection Agency regulations in 40 CFR Part 261.

HIGH-EFFICIENCY PARTICULATE AIR (HEPA) FILTER: A high-efficiency particulate air filter having a fibrous medium that produces a particle removal efficiency of at least 99.97 percent for 0.3- μ m particles of dioethylphthalate (DOP) when tested in accordance with MIL-STD-282.

HIGH-LEVEL RADIOACTIVE WASTE (HLRW): The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic (TRU) waste and fission products in concentrations as to require permanent isolation; defined in section 1 le. (2) of the Atomic Energy Act of 1954.

HYDROGEOLOGY: The study of groundwater, with particular emphasis on its relation to the geologic environment, the mode of migration, and chemistry.

HYDROGEOLOGIC UNIT: Any soil or rock unit or zone which, by virtue of its porosity or permeability or lack thereof, has a distinct influence on the storage or movement of groundwater.

IN SITU: In the natural or original position; used to refer to in-place experiments at a storage or disposal site.

INADVERTENT INTRUDER: A person who might occupy a disposal site after closure and engage in normal activities, such as agriculture, dwelling construction, or other pursuits, in which the person might be unknowingly exposed to radiation or chemical contamination from the waste.

INTRUDER BARRIER: A sufficient containment of the waste that inhibits human contact with waste and helps to ensure that radiation and chemical exposures to an inadvertent intruder will meet the performance objectives set forth in 10 CFR 61 or 40 CFR 261; or engineered structures that provide equivalent protection to the inadvertent intruder.

ION: Atomic particle, atom, or chemical radical bearing an electrical charge, either negative or positive.

ION EXCHANGE: A reversible interchange that takes place between ions of like charge, usually between ions present on an insoluble solid and ions in a solution surrounding the solid. An important process in both fundamental and industrial chemistry.

ION EXCHANGE RESIN: An insoluble polymerized electrolyte that contains either acidic groups for exchanging cations or basic groups for exchanging anions. It contains large, high-molecular-weight ions of one charge and small, simple ions of the opposite charge. The small ions undergo exchange with ions in solution.

IONIZING RADIATION: Any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter.

ISOTOPES: Nuclides having the same number of protons in their nuclei, and hence the same atomic number, but differing in the number of neutrons, and therefore differing in the mass number. Identical chemical properties exist between isotopes of a particular element. Stabilities of differing isotopes of a particular element may vary, hence their propensity to disintegration and half-life.

KARST: Surface or subsurface rock mass conditions characterized by solution-formed caverns, open joints, pinnacles, and depressions of a highly irregular form. Almost exclusively applied to carbonate lithologies, e.g., limestone, but may effectively be applied to evaporite lithologies also, e.g., gypsum. Can be a geological characterization implying highly irregular and difficult-to-predict geohydrological conditions.

LAND DISPOSAL FACILITY: Land, buildings, and equipment intended to be used for the disposal of radioactive and/or hazardous wastes into the subsurface of the land. A geologic repository as defined in 10 CFR 60 is not considered a land disposal facility. (10 CFR 61.2)

LEACHATE: A solution containing dissolved and finely suspended solid matter and microbial waste products resulting from groundwater or infiltrating surface water seepage through solid waste.

LEACHING: The process of extracting a soluble component from a solid by the percolation of a solvent (e.g., water) through the solid.

LIQUEFIABLE: Susceptible to near-total loss of shear strength and bearing capacity during seismic disturbances; used with reference to soils.

LITHOLOGY: The character of a rock formation or of the rock found in a geological area or stratum expressed in terms of its structure, mineral composition, color, and texture.

LOW-LEVEL RADIOACTIVE WASTE (LLRW): Radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or uranium and thorium mill tailings.

MIXED WASTE (MW): Waste containing both a radioactive component defined by the Atomic Energy Act (source, byproduct or special nuclear material) and a hazardous component defined in the Resources Conservation and Recovery Act (listed or characteristic wastes).

MONITOR WELL: Device designed and constructed for acquisition of groundwater samples that are representative of the chemical quality of the aquifer/groundwater adjacent to the screened interval and isolated from the overlying and underlying geologic and hydrologic materials; with appropriate design provides access to measure the potentiometric surface of the particular confined aquifer or the water table.

NEAR-SURFACE DISPOSAL FACILITY: A land disposal facility in which radioactive waste is disposed of in or within the upper 30 m of the earth's surface.

PERMEABILITY: The capacity of a porous medium to conduct liquids or gases. Dependent on the viscosity and other characteristics of the conducted fluids and ambient conditions.

PIEZOMETER: An instrument for measuring pressure head in groundwater. In an unconfined aquifer (that with a water table) a piezometer is frequently an open-bottomed monitor well extending below that water table.

PRECISION: A measure of the repeatability or reproducibility of a particular measurement under a given set of conditions; a measure of variability; commonly expressed in terms of standard deviation or in terms of range.

PSYCHROMETER: Device used for measuring the amount of water vapor in air; e.g., a hygrometer.

PYROPHORIC: Igniting spontaneously. A pyrophoric liquid is any liquid that ignites spontaneously in dry or moist air at or below 130 °F (54.5 °C). A pyrophoric solid is any solid material, other than one classed as an explosive, which under normal conditions is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious transportation, handling, or disposal hazard. Included are spontaneously combustible and water-reactive materials.

QUALITY ASSURANCE: All those planned and systematic actions necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily and safely in service. Quality assurance (QA) includes quality control (QC), which is all those actions necessary to control and verify the features and characteristics of a material, process, product, or service to specified requirements.

QUALITY ASSURANCE RECORDS: Includes results of reviews, inspections, audits, and material analyses; monitoring of work performance, qualification of personnel, procedures, and equipment; and other documentation such as drawings, special reports, and corrective action reports.

RAD: The unit of absorbed dose of ionizing radiation equal to 100 ergs per gram or 0.01 joule per kilogram.

RADICAL, CHEMICAL: A semi-stable fragment of the molecule of a molecular chemical compound; is comprised of more than one atom; carries an electrical charge, either positive or negative, but is not an ion which is a single electrically charged atom; because of unsatisfied electrical charge, is chemically reactive.

RADIOACTIVITY: The property of certain naturally unstable isotopes of spontaneously emitting particles or

gamma radiation, or of emitting X radiation following orbital electron capture, or of undergoing spontaneous fission; *radioactive decay*.

REM: A special unit of dose equivalent [Roentgen Equivalent Man]. The dose equivalent in rems is numerically equal to the absorbed dose in rads multiplied by the quality factor, the distribution factor, and any other necessary modifying factors. (1 millirem = 0.001 rem)

REMEDIAL ACTION: Defined by CERCLA, Section 101 (24), as “those actions taken...in the event of a release or threatened release of hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment.” Can include isolation, treatment, disposal, or removal actions.

REPOSITORY: A term generally applied to a facility for the disposal of radioactive wastes, particularly high-level waste and spent fuel.

ROENTGEN: The special unit of exposure. One Roentgen equals 2.58×10^{-4} Coulomb per kilogram of air. The international unit of X radiation or gamma radiation that is the amount of radiation producing, under ideal conditions in one cubic centimeter of air at 0 °C and 760 mm Hg pressure, ionization of either sign equal to one electrostatic unit of charge.

RUNOFF: Any water, leachate, or liquid which flows overland from onsite to offsite or that portion of precipitation which flows overland.

SEISMIC: Of, pertaining to, of the nature of, subject to, or caused by an earthquake.

SHALL: Denotes a requirement.

SHALL CONSIDER: Requires that an objective assessment be performed to determine to what extent the specific factor, criterion, guideline, standard, etc., will be incorporated into or satisfied by the referenced action or design. The results and basis of this assessment shall be documented. Such documentation shall be retrievable and can be in the form of engineering studies, meeting minutes, reports, internal memoranda, etc.

SITE CLOSURE AND STABILIZATION: Those actions that are taken upon completion of operations that prepare the disposal site for custodial care and that assure

that the disposal site will remain stable and will not need ongoing active maintenance.

SUBSIDENCE: Sinking or depression of the ground surface; generally due to loss of subsurface support.

SURVEILLANCE: Observation of the disposal site for purposes of visual detection of need for maintenance, custodial care, evidence of intrusion, and compliance with other license and regulatory requirements.

TECTONIC: Of or pertaining to the deformation of the earth's crust, the forces involved in or producing such deformations, and the resulting rock structures and external forms.

TRANSMISSIVITY: A basic geohydrological property of an aquifer; the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under unit hydraulic gradient; calculated as the product of the effective permeability times the effective thickness of the aquifer.

TRANSURANIC (TRU) WASTE: Waste that is contaminated with alpha-emitting radionuclides of atomic number greater than 92 and half-lives greater than 20 years in concentrations greater than 100 nanoCuries per gram (nCi/g), or has a smearable alpha contamination greater than 4,000 dpm/cm² averaged over the accessible surface.

TREATMENT: Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste nonhazardous or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

UNSATURATED ZONE: The zone of soil or rock between the ground surface and the water table; also termed the vadose zone.

VADOSE ZONE: The zone of soil or rock between ground surface and the top of the groundwater that contains water disseminated through the pore volumes at pressures less than atmospheric pressure and that will thus not flow freely into wells penetrating the zone.

VALIDATION: For the purposes of environmental investigations, refers to a systematic process of reviewing a body of data against a set of criteria to assure that the data are acceptable for their intended use.

VAULT: An artificial enclosed volume covered by an overhead structure; especially a passage or room used for storage or safekeeping.

VERIFICATION: For the purposes of environmental investigations, refers to a systematic process of determining whether procedures, processes, data, or documentation conform to specified requirements.

VULCANISM: The processes by which magma (molten rock material within the earth) and its associated gases rise into the earth's crust and are extruded onto the earth's surface and into the atmosphere.

WATER TABLE: The surface within an unconfined aquifer between the zone where water freely flows and the vadose zone; that surface of a body of unconfined groundwater at which the pressure is equal to atmospheric pressure. Effectively, the elevation of the water at equilibrium inside a piezometer penetrating an unconfined aquifer.

X-RADIATION; X-RAY: Electromagnetic waves resulting from high energy orbital electrons dropping to a lower energy state; may be spontaneously emitted by some isotopes but is artificially produced by high energy electrons impinging on a metal target.